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Creation of High Resolution OMNI and Other Merged ACE, Wind and IMP 8 Data Sets, and Solar Wind Cross-Correlations

This proposal is for a solar wind structure analysis via comprehensive cross-correlation analyses of solar wind field and plasma data from the ACE, Wind and IMP 8 spacecraft. Analyses will be performed over multi-year durations, and will assess correlation levels as functions of spacecraft separation vectors, solar wind flow types (low vs. high variances, low vs. high speed, CME's vs. "normal" flows, etc.) and time resolution of data. In anticipation of this analysis, the first year will be committed to creation of a hierarchy of data sets to be used in the analysis and to be made community-accessible initially via the NSSDC FTPBrowser family of interfaces. All but the last member of the hierarchy will be spacecraft-specific. The hierarchy will consist of (1) merged IMF-plasma-position data sets at plasma moments resolution; (2) a version of the first set resampled at a common 1-min resolution; (3) a version of the second set time-shifted via the minimum variance techniques of Weimer et al (2003) to the nose of the Earth's bow shock; (4) a single 1-min data set created by interspersing data from the spacecraft-specific time-shifted data sets. This last data set may be considered as a high-resolution OMNI data set, and should be very useful for solar wind-magnetosphere coupling studies. The availability of this hierarchy of data sets will facilitate pursuit by many researchers of studies of LWS-relevant solar wind structures and of solar wind-magnetosphere coupling. Researchers will have the option of starting at whatever level of the hierarchy they deem optimal for their analyses. Results of the second-year solar wind structure analyses will contribute to the growing understanding of such structures important for space weather predictability purposes.